Microwave Kinetic Inductance Detector Development

Completed Technology Project (2013 - 2017)

Project Introduction

In recent decades, time-resolved multi-wavelength observations have gained increased importance in the study of X-ray binaries and similar star systems. Previous studies of these systems have focused on time-averaged spectra ranging from radio to hard X-rays, and time variability studies have been difficult in the lower energy regimes. Now, thanks to newly available optical and infrared instruments capable of fast readout with high efficiency, the study of rapid time variability in the multi-wavelength light curves of X-ray binaries is beginning to look very promising. One instrument capable of making these observations is the ARray Camera for Optical to Near-IR Spectrophotometry (ARCONS). ARCONS uses a new superconducting technology called Microwave Kinetic Inductance Detectors (MKIDs). Current MKID arrays are quite small and are limited in the types of objects they can observe. In order to make real progress, these arrays must contain many thousands of pixels. The technological challenges of building and reading out large low temperature arrays (more than ~1000 pixels) are formidable, but MKIDs have an advantage over many of these arrays due to their ease of fabrication and readout. I propose to develop larger MKID arrays with higher energy resolution so that they may be used to observe important time-variable science targets.

Anticipated Benefits

Current MKID arrays are quite small and are limited in the types of objects they can observe. In order to make real progress, these arrays must contain many thousands of pixels. The technological challenges of building and reading out large low temperature arrays (more than ~1000 pixels) are formidable, but MKIDs have an advantage over many of these arrays due to their ease of fabrication and readout. This project aims to develop larger MKID arrays with higher energy resolution so that they may be used to observe important time-variable science targets.

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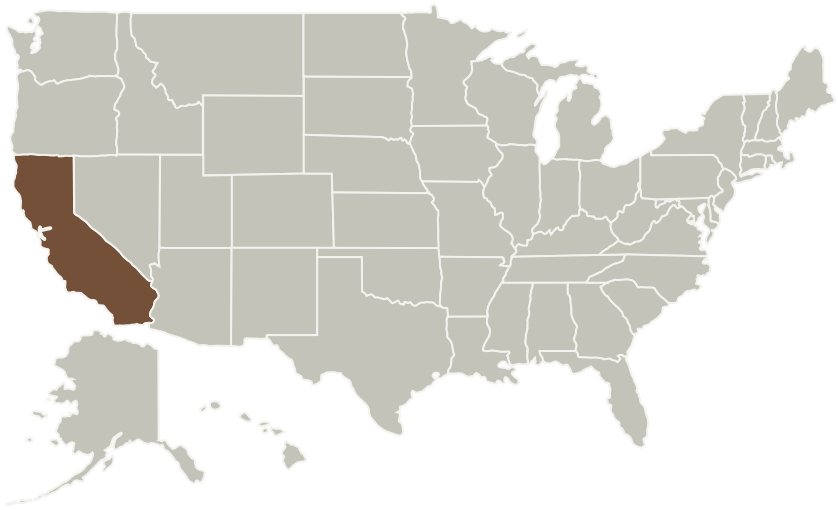
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
University of California-Santa Barbara(UCSB)	Lead Organization	Academia Asian American Native American Pacific Islander (AANAPISI)	Santa Barbara, California

Primary U.S. Work Locations
California

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

University of California-Santa Barbara (UCSB)

Responsible Program:

Space Technology Research Grants

Project Management

Program Director:

Claudia M Meyer

Program Manager:

Hung D Nguyen

Principal Investigator:

Benjamin A Mazin

Co-Investigator:

Paul Szypryt

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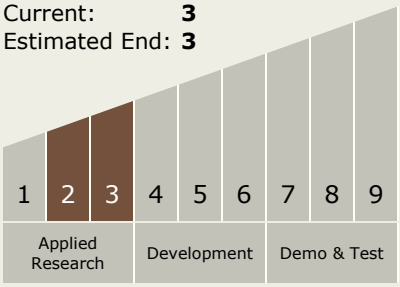
Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes

Target Destination

Outside the Solar System